Chemistry Library

CONTENTS

Soil Sampling with a Compressed Air Unit. H. F. Blaney and C. A. Taylor..... 1
Ammonium Calcium Balance: A Concentrated Fertilizer Problem. L. G. Willis and J. R. Piland..... 5
The Nature of the Base-Exchange Material of Bentonite, Soils, and Zeolites, as Revealed by Chemical Investigation and X-Ray Analysis. W. P. Kelley, W. H. Dore and S. M. Brown..... 25
The Laws of Soil Colloidal Behavior: IV. Isoelectric Precipitates. Sante Mattson... 57
Book Reviews..... 79
The Temperature Correction in the Hydrometer Method of Mechanical Analysis of Soils. Charles Richter..... 85
Interaction Between Ammonia and Soils, as a New Method of Characterizing Soil Colloids. Amar Nath Puri..... 93
Determination of the Percentage Base Saturation of Soils and its Value in Different Soils at Definite pH Values. W. H. Pierre and G. D. Scarseth..... 99
A Mathematical Study of the Decrease of Crop Yields. J. Dudley Greaves..... 115
The Fungus Flora of the Soil. H. L. Jensen..... 123
The Nature of Soil Acidity as Affected by the SiO_2-Sesquioxide Ratio. L. D. Baver and G. D. Scarseth..... 159
A Method of Oxidizing and Dissolving Soil for the Determination of Total and Filterable Manganese and Phosphorus. E. M. Emmert..... 175
Hydrogen-Ion Concentration, Aluminum Concentration in the Soil Solution, and Percentage Base Saturation as Factors Affecting Plant Growth on Acid Soils. W. H. Pierre..... 183
Changes in the Availability of Phosphorus in Irrigated Rice Soils. R. P. Bartholomew. 209
The Influence of Combined Nitrogen on Growth and Nitrogen Fixation by Azotobacter. James E. Fuller and Leo F. Rettger..... 219
A Large Sand Culture Apparatus. Frank M. Eaton..... 235
Book Reviews..... 243
Martinus Willem Beijerinck, 1851–1931..... 245
Soil Organic Matter-Temperature Relationship in the Eastern United States. Hans Jenny..... 247
Soil Forming Processes in the Hawaiian Islands from the Chemical and Mineralogical Points of View. Harold S. Palmer..... 253
Further Evidence Concerning the Toxic Action of Aluminum in Connection with Plant Growth. Basil E. Gilbert and Frederick R. Pember..... 267
A Simple Method of Estimating Total Exchangeable Bases in Soils. Amar Nath Puri... 275
Sampling Market-Garden Soils for Nitrates. J. Eric Blaney and John B. Smith.... 281
The Conception of Flow-Plasticity as Applied to Soils. G. W. Scott Blair..... 291
The Stimulation of Lemna Major by Organic Matter Under Sterile and Non-Sterile Conditions. Norman Ashwell Clark and Emery M. Roller..... 299
The Laws of Soil Colloidal Behavior: V. Ion Adsorption and Exchange. Sante Mattson..... 311
Felix Löhnis, 1874–1930..... 333
Conservation and Availability of the Nitrogen in Farm Manure. A. Floyd Heck..... 335
The Interrelationships of Certain Single-valued Soil Properties. G. B. Bodman and Esther P. Perry..... 365

a.L.H.

Photosensitized Oxidation of Ammonia and Ammonium Salts and the Problem of Nitrification in Soils. G. Gopal Rao and N. R. Dhar..... 379
Changes Produced in Nitrogenous Compounds by Rhizobium meliloti and Rhizobium japonicum. George Gordon Pohlman..... 385
A Method of Application Designed to Insure Proper Distribution of Fertilizers in Field Trials with Fruit Trees. L. R. McKinnon and Omund Lilleland..... 407
The Carbon-Nitrogen Ratio in Relation to the Accumulation of Organic Matter in Soils. Frederick J. Salter..... 413
Phosphorus Assimilation by Soil Microorganisms. L. G. Thompson, Jr., F. B. Smith, and P. E. Brown..... 431
Chemical Methods for Estimating the Availability of Soil Phosphate. P. L. Hibbard..... 437
The Availability of the Nitrogen in Farm Manure under Field Conditions. A. Floyd Heck..... 467
Determination of Soil Organic Matter. C. J. Schollenberger..... 483
The Modeling of Soils, an Aid in Their Study. R. H. Carr..... 487

ILLUSTRATIONS

PLATES

Soil Sampling with a Compressed Air Unit

Plate 1. Compressed Air Unit for Soil Sampling 3
Fig. 1. Compressor unit and air hammer in operation 3
2. Detail view of air hammer 3

Ammonium Calcium Balance: A Concentrated Fertilizer Problem

Plate 1. Type of Injury to Cotton Seedlings and Degree of Control as a Result of Complete Fertilizer Supplemented with Other Treatments 19
Fig. 1. Complete fertilizer treatment no. 1 19
2. Complete fertilizer treatment no. 4 19
Plate 2. Effect of Diammonium Phosphate on Growth of Cotton Seedlings 21
Fig. 1. Diammonium phosphate (1 gm.) treatment no. 1 21
2. Diammonium phosphate treatment no. 3 21
3. Diammonium phosphate treatment no. 2 21
Plate 3. Effect of Calcium Salts on Ammonium Hydroxide Injury to Cotton Seedling. 23
Fig. 1. Ammonium hydroxide (0.13 gm.) treatment no. 3 23
2. Ammonium hydroxide treatment no. 4 23
3. Ammonium hydroxide treatment no. 5 23

The Nature of the Base-Exchange Material of Bentonite, Soils, and Zeolites, as Revealed by Chemical Investigation and X-Ray Analysis

Plate 1. X-Ray Diffraction Patterns of Bentonites and Soil Colloids 47
Fig. 1. Interplanar spacings of different samples of bentonite 47
2. The structural similarity between bentonites and soil colloids 47
Plate 2. The Structural Relationship of Different Clay Minerals 49
Plate 3. X-Ray Diffraction Patterns of Bentonite and Soil Colloids as Affected by Grinding 51
Fig. 1. The crystalline structure of bentonites as affected by grinding 51
2. The crystalline structure of soil colloids as affected by grinding 51
Plate 4. Diffraction Patterns of Bentonite and Soil Colloids as Affected by Base-Replacement 53
Fig. 1. Crystalline structure of bentonite as affected by base replacement 53
2. Crystalline structure of soil colloids as affected by base replacement 53
Plate 5. Effect of Heat on the Crystalline Structure of Bentonite 54

A Large Sand Culture Apparatus

Plate 1. Sand Beds as Set Up and Used at the Rubidoux Laboratory, Riverside, California 241

The Stimulation of Lemna Major by Organic Matter under Sterile and Non-Sterile Conditions

Plate 1. Growth of Sterile and Non-sterile Lemna 309
Fig. 1. Sterile and none-sterile Lemna after 10 days on different nutrient media 309
2. Sterile Lemna in inorganic nutrient solution 309

CONSERVATION AND AVAILABILITY OF THE NITROGEN IN FARM MANURE

Plate 1. Growth of Oats on Soils Variously Treated 361
Fig. 1. Comparative growth of oats on the control and also on the dung alone from cow manure treated in various ways 361
2. Comparative growth of oats on fresh cow manure and the same after being dried 361
3. Comparative growth of oats on fermented cow manure and the same after being dried 361
Plate 2. Growth of Buckwheat on Soils Variously Treated 363
Fig. 1. Comparative growth of buckwheat following oats on the same pots shown in plate 1, figure 2 363
2. Comparative growth of buckwheat following oats on the same pots shown in plate 1, figure 3 363

A METHOD OF APPLICATION DESIGNED TO INSURE PROPER DISTRIBUTION OF FERTILIZERS IN FIELD TRIALS WITH FRUIT TREES

Plate 1. Construction and Operation of Soil Injection Rod 411
Fig. 1. Parts used in the construction of the soil injection rod 411
2. Insuring proper distribution of fertilizer salts with soil injection rods .. 411

THE AVAILABILITY OF THE NITROGEN IN FARM MANURE UNDER FIELD CONDITIONS

Plate 1. Barley as Affected by Various Fertilizer Treatments 481
Fig. 1. Barley on the control, no manure or nitrogen added 481
2. Barley from 12 tons an acre of artificial manure made from straw by the use of ammonium sulfate, and plowed down immediately after being spread 481
3. Barley from 12 tons an acre of complete fermented manure, plowed down immediately after being spread 481
4. Barley from 12 tons an acre of complete fermented manure,—allowed to dry in the field before being plowed down 481

THE MODELING OF SOILS, AN AID IN THEIR STUDY

Plate 1. Models Made from Soils 489

TEXT-FIGURES

THE LAWS OF SOIL COLLOIDAL BEHAVIOR: IV. ISOELECTRIC PRECIPITATES

Fig. 8. The Relation Between the pH, the Sign of Charge, the Migration Velocity, and the Ratio of Gram Humus to Millimol Sesquioxide in a Series of Aluminum and Ferric "Humates" 73
9. The Relation Between the pH, the Sign of Charge, and the Migration Velocities of "Hydroxides," "Silicates," and "Phosphates" of Aluminum and Iron 74
10. The Relation Between the pH and the Isoelectric Composition of Aluminum and Ferric "Phosphates," and "Humates" 76

THE TEMPERATURE CORRECTION IN THE HYDROMETER METHOD OF MECHANICAL ANALYSIS OF SOILS

Fig. 1. Relation of Concentration of Soil Suspension to the Error Involved in the Application of the Temperature Correction of the ±0.35 Factor to the Hydrometer Reading 87
2. Correlation Between Hydrometer Reading and Computed Correction to Give Concordant Results 88

3. Correlation Between Temperature and Hydrometer Reading at Different Concentrations and Their Relation to the Density of Water at Different Temperatures..... 91

A Mathematical Study of the Decrease of Crop Yields

Fig. 1. Type Curve Yield vs. Time..... 118
2. Rothamsted Rotation Plots Agdell Field Fallow System..... 118
3. Rothamsted Rotation Plots Agdell Field Legume System..... 118
4. Rothamsted Rotation Plots Agdell Field Fallow System..... 118
5. Rothamsted Rotation Plots Agdell Field Legume System..... 118
6. Rothamsted Rotation Plots Agdell Field Fallow System..... 118
7. Rothamsted Rotation Plots Agdell Field Legume System..... 118
8. Rothamsted Rotation Plots Agdell Field Fallow System..... 118
9. Rothamsted Rotation Plots Agdell Legume System..... 119
10. Rothamsted Rotation Plots Agdell Field Fallow System..... 119
11. Rothamsted Rotation Plots Agdell Field Legume System..... 119
12. Rothamsted Rotation Plots Agdell Field Fallow System..... 119
13. Rothamsted Rotation Plots Agdell Field Legume System..... 119
14. Rothamsted Experimental Plots Hoos Field No Manure..... 119
15. Rothamsted Experimental Plots Broadbalk Field No Manure..... 119
16. Rothamsted Experimental Plots Broadbalk Field No Manure..... 119
17. Rothamsted Experimental Plots Broadbalk Field No Manure..... 120
18. Rothamsted Experimental Plots Hoos Field No Manure..... 120
19. Rothamsted Experimental Plots Hoos Field No Manure..... 120
20. Rothamsted Experimental Plots Potatoes Every Year..... 120
21. Rothamsted Experimental Plots Permanent Meadow No Manure..... 120

The Nature of Soil Acidity as Affected by the SiO_2-Sesquioxide Ratio

Fig. 1. The Effect of Time on the Titration Curves of Colloidal Clay Acids..... 162
2. Titration Curves of Colloidal Clay Acids Extracted from Various Southern Soils. 164
3. Titration Curves of Colloidal Clay Acids Extracted from Oktibbeha Clay..... 164
4. Titration Curves of Colloidal Clay Acids Extracted from Different Clays..... 165
5. Titration Curves of Colloidal Clay Acids Extracted from Different Horizons of Susquehanna Clay..... 165
6. Titration Curves of Colloidal Clay Acids Extracted from Various Silt-Loams..... 166
7. The Relation of the Total Exchange Capacity to the SiO_2-Sesquioxide Ratio.... 166

A Large Sand Culture Apparatus

Fig. 1. Section of Sand Culture Apparatus, Showing Sandbed, Solution Barrels, and Plumbing..... 237

Soil Organic Matter-Temperature Relationship in the Eastern United States

Fig. 1. Organic Matter-Temperature-Diagram of Soils from the Eastern United States... 248

The Conception of Flow-Plasticity as Applied to Soils

Fig. 1. Flow Curve of Soil..... 292
2. Characteristic Soil Dilution Curves..... 297

The Stimulation of Lemna Major by Organic Matter under Sterile and Non-Sterile Conditions

Fig. 1. Rate of Reproduction ($K \times 100$) of Non-sterile Lemna in Inorganic Medium with Extracts of Organic Matter in Parts Per Million of Dry Matter..... 301

THE INTERRELATIONSHIPS OF CERTAIN SINGLE-VALUED SOIL PROPERTIES

Fig. 1. Relation Between Air-dry Moisture Content and Colloid by Adsorption..... 373
2. Relation Between Moisture Equivalent, Sticky Point, Rolling-out Limit and Non-sticky Plastic Range..... 376

THE CARBON-NITROGEN RATIO IN RELATION TO THE ACCUMULATION OF ORGANIC MATTER IN SOILS

Fig. 1. Relation of Nitrate Recovery in the Kjeldahl Method to the Quantity of Nitrate Present..... 419
2. Trend of Carbon to Nitrogen Ratios..... 426

CHEMICAL METHODS FOR ESTIMATING THE AVAILABILITY OF SOIL PHOSPHATE

Fig. 1. Relation of PO_4 in Dilute Acid Extract to pH of the Extract..... 441
2. PO_4 in Extracts Made by Continuous Percolation with 0.001 *N* HCl..... 452

THE AVAILABILITY OF THE NITROGEN IN FARM MANURE UNDER FIELD CONDITIONS

Fig. 1. Plan of Small Field Plots Used to Determine the Nitrogen Availability of Manure. 469
2. Nitrification Curves on Fallow during the Growth Period of Spring Barley on Similarly Manured Land..... 474